Translation

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Traffic announcement system

Patent Claims

1. A traffic announcement system having a microphone, a power amplifier and a loudspeaker, wherein filters are provided which effect a decrease in the frequencies below 1 kHz with a steepness of at least 12 dB per octave and an increase in the frequencies above 1 kHz with a steepness of approximately 3 dB per octave.

2. The traffic announcement system as claimed in claim 1, wherein the first filter effects a decrease with a steepness of approximately 18 dB per octave.

3. The traffic announcement system as claimed in claim 1, wherein a filter is provided which effects a sharp decrease in the frequencies above 6 kHz.

4. The traffic announcement system as claimed in claim 1, which is combined with a tone sequence switching device for vehicles having right of way in such a way that the emission of the signal tones is performed via the loudspeaker of the traffic announcement system.

The invention relates to a traffic announcement system having a microphone, a power amplifier and a loudspeaker. Such traffic announcement systems, which are suitable, for example, for announcing information to travellers at railway stations, or for announcing directions by the police, fire brigade or other agencies

authorised to issue directions in road traffic, suffer particularly from too low speech intelligibility.

It is the object of the invention to improve the speech intelligibility and to achieve a better utilisation of the amplifier power. For this purpose, the invention provides filters which effect a decrease in the frequencies below 1 kHz with a steepness of at least 12 dB per octave and an increase in the frequencies above 1 kHz with a steepness of approximately 3 dB per octave.

The invention is based on the following observations:

The acoustic transmission of speech where there is traffic noise is subjected to various impairing influences. The lower frequency components of speech are frequently masked by environmental noise, and the higher frequencies are attenuated by reflections, scattering and atmospheric losses. It therefore appears to be sensible to transmit only a medium frequency range with the entire power available. This is confirmed by research on the penetrating capacity of acoustic signals (for example, horns and fanfares) in road traffic. It has been established in this connection that the main frequency of a useful signal should be at approximately 2.5 kHz.

It has further been observed that it is normal to talk into public-address microphones from a short distance. When a microphone is talked into from close up, the amplitude statistics of a male voice exhibit a sharp increase in the proportion of the low frequencies in the

range from 1000 Hz downwards to approximately 500 Hz with a steepness of approximately 12 dB per octave.

This increase is particularly damaging because for one thing these low-frequency components determine the maximum modulation of the power amplifier because of their relatively large amplitude. Reducing these components would thus permit a higher amplification of the useful frequencies, for example also the frequencies around 2.5 kHz. On the other hand, such amplifiers are in practice almost always overdriven. In the event of strong overdrive, approximately square-wave oscillations are produced whose frequency is equal to the fundamental frequency of the human voice. They are situated at approximately 100 to 200 Hz. Such a reproduction is largely incomprehensible, since to the hearer this fundamental frequency contains information only on the pitch (speech melody), but not on the vowels, which are important for speech intelligibility and whose strongest frequency component is situated in the formant range from approximately 500 to 5000 Hz. It is therefore expedient to reduce the low frequencies below the formant range in a very steep-edged fashion. Such an improved amplifier causes square-wave oscillations to be produced in the event of overdriving whose fundamental frequencies move within the formant range.

Experiments have shown that a reduction of more than 12 dB per octave has a still more favorable effect in the case of overdrive than does simply the compensation of

the effect due to speaking from close up. It is therefore advantageous to build in a high-pass filter having a steepness of approximately 18 dB per octave and a cut-off frequency situated at approximately 1 kHz. If it is desired to achieve a geometrical center frequency of approximately 2.5 kHz in accordance with the most favorable frequency for signals for speech transmissions as well, the upper cut-off frequency for speech transmission results as a frequency of approximately 6 kHz.

Since the amplitude statistics of a male voice further exhibits a mean drop of approximately 3 dB per octave in the range from 1 to 6 kHz, an increase to this extent seems necessary if it is desired in the event of overdriving of the amplifier to convert all the speech information situated in this range into square-wave oscillations in a uniformly effective fashion.

A sharp decrease in the transmitted frequencies should then be undertaken above 6 kHz, it being possible to provide a further filter for this purpose. Since, however, it is possible in any case to observe in many public-address microphones a sharp drop above the region of 6 kHz, this filter can frequently be omitted.

The efficiency or the range of such a traffic announcement system is enhanced in conjunction with the same power as a result of the measures according to the invention. It can be modulated higher, since the low-frequency components disappear together with their large amplitudes, and the amplification of the signals at

2.5 kHz can therefore be increased, and since the degree of overdrive can be pushed higher without intelligibility being decreased to an impermissible extent. Furthermore, the risk of acoustic feedback is smaller, since the high frequencies are generally highly focused in the direction of the sound emission, while the lower frequencies reduced according to the invention rather pass back to the microphone due to diffraction and could thus cause acoustic feedback if, as in the case of loudspeakers mounted on the roof of a police vehicle, for example, the microphone is talked into just next to the loudspeaker. The available power can thus be used optimally.

It is expedient to combine the traffic announcement system with a tone sequence switching device for vehicles having right of way, by using the loudspeaker of the system to emit the signal tones, as well. The frequencies for the high and low tone can be generated electronically in a known fashion. The space required for the supertone horns is saved, in particular.

Translator's Report/Comments

Your ref: Hughes (Woolcott) 47273/T Your order of (date): 4/11/92

In translating the above text we have noted the following apparent errors/unclear passages which we have corrected or amended

Page/para/line*	Comment
Col. 1/64	Nachbesprechung -> Nahbesprechung (Cf. Col 2/28)

* This identification refers to the source text. Please note that the first paragraph is taken to be, where relevant, the end portion of a paragraph starting on the preceding page. Where the paragraph is stated, the line number relates to the particular paragraph. Where no paragraph is stated, the line number refers to the page margin line number.